REMARKS

Re-examination and reconsideration of the subject matter identified in caption, as amended, pursuant and consistent with 37 C.F.R. § 1.116 and in light of the remarks which follow are respectfully requested.

Claims 1-11, 13-18 and 20 are pending in the application and under consideration, as claims 12 and 19 have been canceled above. By the above amendments, independent claims 1 and 18 have been revised in response to the Examiner's statements at pages 8-9 of the Official Action. Support may be found at least in the attached Comparison of Materials: Coefficient of Thermal Expansion, which evidences an overlapping range for the materials claimed.

At the outset, the undersigned notes with appreciation the Examiner's withdrawal of the 35 U.S.C. §112, first paragraph, rejection.

Claim Rejection* - 35 *USC* § *112

Claims 12 and 19 stand rejected under 35 U.S.C. §112, second paragraph, as allegedly failing to point out and distinctly claim the subject matter which applicant regards as the invention. This rejection has been obviated by the above cancelation of claims 12 and 19. Thus, withdrawal of this objection is in order.

Claim Rejections* - 35 *USC* § *103

Claims 1-20 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Ogata et al. (Japanese Patent Document No. 02043362 A) in view of Shindo et al. (U.S. Patent No. 6,485,542 B2)[1]; claims 1, 3-5 and 12-20 stand rejected under §103(a) as allegedly being unpatentable over Fukumoto et al. (Japanese Patent Document No. 11-200028-A) in view of Shindo et al; claim 2 stands rejected under §103(a) as allegedly being unpatentable over Fukumoto et al. and Shindo et al in view of Hunt et al. (U.S. Patent No. 6,073,830). The

[1] Corresponds to U.S. Patent Publication No. 2001/0032686 A1, cited in the Official Action

claims, as now presented, cannot be rejected over these documents for the following reasons.

The present invention relates to a method of bonding a sputter target to a backing plate, and more specifically, the use of a backing plate having spaced-apart ridges on the bonding surface of the backing plate.

In accordance with one aspect of the invention, and as set forth in independent claim 1, a method for forming a solder bonded sputter target/backing plate assembly is provided. The method includes (a) forming a backing plate with a bonding surface having a plurality of segmented and spaced-apart ridges that are machined and disposed on and within the periphery of the bonding surface of the backing plate, which perform as spacers/standoffs for the supply of solder material between said backing plate and a sputter target; (b) forming the sputter target from a ferromagnetic material and having a sputtering surface and substantially flat bonding surface, and wherein the backing plate and the sputter target have similar coefficients of thermal expansion; (c) applying the solder material to the interface spaces defined by superimposing the sputter target within the periphery of and onto the plurality of ridges on the backing plate; and (d) allowing the solder material to solidify and bond the sputter target to the backing plate so that the plurality of ridges provide an effective uniform thickness solder bonded interface.

Ogata et al. pertains to a method of joining a sputter target and a backing plate by a brazing material. Ogata et al., however, does not disclose the features of the present invention. For example, Ogata et al does not concern the uniform thickness of a target assembly in order to achieve optimal thickness and sheet resistance uniformity of sputtered films. In this regard, the presently claimed invention recites the spaced apart ridges machined into the backing plate and segmented to accommodate the solder supplied between the backing plate and the sputter target which is made of ferromagnetic materials. Thus, the sputtering target and the backing plate have similar coefficients of thermal expansion, and the ridges act as spacers to ensure a substantially uniform solder thickness. By comparison, Ogata et al. simply provides channels (e.g., grooves or slots) in the

bonding surface of the backing plate, which appear to extend over the entire surface of the backing plate for the purpose of minimizing warping that occurs during bonding of materials having a large difference in thermal expansion. In this regard, the Examiner's attention is drawn to the materials bonded in Ogata et al. They are rare earth materials bonded to copper. These materials have a large difference in thermal expansion, and the bonding would create warping, but for the channels formed in the backing plate. By comparison, in the present invention it is a solder material which unites the backing plate and the sputtering target (e.g., materials having a similar thermal expansion) and leads to the use of an effective uniform thickness solder bonded interface.

Clearly, Ogata et al. does not disclose raised protrusions in the form of segmented space-apart ridges on the bonding surface of the backing plate to accommodate the solder and provide a uniform thickness interface. Neither the structure nor the processes of making the structure are the same as those suggested by Ogata et al.

Fukumoto et al., like Ogata et al. relates to bonding of a target and backing plate with substantially different thermal expansion differential. In order to accommodate this differential, Fukumoto et al. provides for tape-shaped spacers placed between the target and the backing plate to minimize warping during the bonding of brittle ceramic materials such as ITO (tin doped indium oxide) to copper. In stark contrast, the present invention calls for a plurality of spaced-apart ridges machined on the bonding surface of the backing plate. The purpose of the ridges is to obtain a uniform bond layer thickness, which is especially important to the performance of ferromagnetic targets. In this regard, ferromagnetic materials such as nickel and cobalt have coefficients of thermal expansion that are close to that of copper.

Shindo et al. relates to Ni-Fe sputtering targets for forming magnetic thin films, and specifically to a Ni-Fe sputtering target for forming ferromagnetic thin films. Col. 1, lns. 15-18. Shindo et al. has been applied for purportedly disclosing soldering the backing plate and the target with In-Sn solder. Official Action at

page 7. However, Shindo et al. does not disclose or suggest the features lacking in either Ogata et al. or Fukumoto et al. taken alone or together.

Hunt et al. has been applied for the disclosure of disc-shaped targets and backing plates. Like, Shindo et al. Hunt et al. does not disclose or suggest (a) forming a backing plate with a bonding surface having a plurality of segmented and spaced-apart ridges that are machined and disposed on and within the periphery of the bonding surface of the backing plate, which perform as spacers/standoffs for the supply of solder material between said backing plate and a sputter target; (b) forming the sputter target from a ferromagnetic material and having a sputtering surface and substantially flat bonding surface, and wherein the backing plate and the sputter target have similar coefficients of thermal expansion; (c) applying the solder material to the interface spaces defined by superimposing the sputter target within the periphery of and onto the plurality of ridges on the backing plate. Thus, even if combined in the manner suggested with Fukumoto et al. and Shindo et al., one of ordinary skill in the art would not arrive at the presently claimed invention.

Accordingly, the target assembly and the method of manufacturing same in in the applied art is different from the present invention. For the foregoing reasons withdrawal of these rejections is in order, and it is respectfully requested.

CONCLUSION

On the basis of the foregoing amendment and response, Applicants respectfully submit that the claims are in condition for allowance. Favorable action on the merits is respectfully requested. If there are any questions regarding this response, the Examiner is encouraged to contact the undersigned at the telephone number provided below.

Applicants believe that this response is timely and that no further fees are due with this response. However, in the event that a fee or credit is owed or due, the Commissioner is authorized to charge or credit any deficiency/overpayment to Deposit Account No. 16-2440.

Respectfully submitted,

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